REMARKS

The Objection to Claim 2

The Examiner has objected to claim 2 since it does not end with a period and is thus considered to be incomplete. Appropriate correction has been made.

The 35 U.S.C. § 103 Rejection of Claims

Claims 1-12, 14, 15, 17, 19, 21 and 22 have been rejected by the Examiner under 35 U.S.C. 103(a) as being unpatentable over Brown (US 5,480,330) in view of Blanchard (US 6,273,768).

Brown (US 5,480,330) describes a water jet pump where the downstream impeller is in or between a cylindrical and convergent conical section or in a convergent conical section; this is both claimed and described; in addition it is the only position shown. See Col. 2, lines 23-29 and 55-61 which describes the intermediate section which includes a cylindrical section and a rearwardly convergent subsection, the rearward impeller is located partially in each of these sections. In addition both independent claims state "a second impeller located partially in said cylindrical subsection and partially in said conical subsection". This conical subsection downstream of the rearward (second) impeller pressurizes the impeller subsection causing the marine propulsion water pump to operate as a high pressure low mass device. A high pressure low mass jet propulsion unit generates thrust in the nozzle section, quite different from the low pressure high mass device claimed in the present application which requires minimal downstream impedance. Brown therefore teaches away from the presently claimed device as it requires a convergent nozzle to generate thrust.

Given the outlet from the downstream impeller in Brown is convergent it cannot be said to "present minimal downstream impedance to the water flowing therethrough.

For clarity claim 1 has been amended to include "*low pressure high mass*"; this is in fact necessary as the object of the invention is to provide a low pressure high mass pump, see page 6 first paragraph of the specification. In addition it has been made clear that the rearward impeller is in direct communication with the outlet.

Brown, when considered either alone or in combination with any of the others cited does not disclose the invention as claimed or at all.

Blanchard (US 6,273,768) describes a water jet propulsion unit that includes a convergent exit nozzle 70, and although this may be a separate component there is no suggestion that this can be removed completely. In the background section Blanchard states in Col. 1, lines 17-18, "a housing, the interior surface of which defines a water tunnel having a convergent nozzle." and Col. 1, lines 20-21 "...impels water rearward through the water tunnel and out the convergent nozzle." Blanchard therefore teaches that this convergent section is required. Thus Blanchard teaches away from the present invention which requires an outlet in direct communication with the rearward impeller, said outlet offering minimal impedance to the water flow therethrough.

Brown and Blanchard both describe a high pressure low mass water jet propulsion device and one skilled in the art may combine these as they generate thrust in the same way, through the nozzle or convergent section downstream of the rearward impeller. However the present invention relates to a low pressure high mass water jet propulsion device which requires an outlet that presents minimal impedance to the flow of water therethrough; there is no suggestion of a nozzle or convergent section following the rearward impeller. Therefore Applicants contend that Brown and Blanchard alone, or combined, teach away from the present invention as they require a nozzle/convergent section downstream of the rearward impeller.

Brown and Blanchard relate to high pressure low mass water jet propulsion devices that generate their thrust in a convergent nozzle/section following the rearward impeller. Both Brown and Blanchard require the convergent section/nozzle after the rearward impeller to operate correctly; the present invention requires an outlet that offers minimal impedance to the water flow to operate correctly. The convergent

section or nozzle teaches away from a minimal impedance outlet, thus Brown and Blanchard teach away from the present invention.

There is no suggestion in Brown or Blanchard that they can operate without this convergent section following the rearward impeller; in fact they specifically describe it in detail. It therefore appears that this nozzle or convergent section is important for the correct operation of the water jet propulsion devices described in Brown and Blanchard. Brown and Blanchard combined or taken alone we believe teach away from a water jet propulsion device with an outlet that offers minimal impedance to the water flow therethrough and which is in direct communication with the downstream impeller.

As previously stated, claim 1 has been amended to include "*low pressure high mass*"; this is in fact necessary as the object of the invention is to provide a low pressure high mass pump, see page 6 first paragraph of the specification. In addition it has been made clear that the rearward impeller is in direct communication with the outlet.

Accordingly, Blanchard, when taken either alone or in combination with any of the others cited does not disclose the invention as claimed or at all.

Claim 13 and 16 have been rejected by the Examiner under 35 U.S.C. 103(a) as being unpatentable over Brown in view of Blanchard, and further in view of Austin (US 3,601,989).

Austin (US 3,601,989) describes a multistage jet propulsion unit with two impellers turning in the same direction each driven by a separate engine. There is no suggestion that either impeller can or should be rotated in the opposite direction to eliminate swirl. Austin aims to provide a higher efficiency jet pump that uses two separate prime movers, one connected to each impeller. Austin indicates in Col. 1, lines 73-75, that stator blades 32 may be used to control some of the liquid vortex. Austin can operate with a single impeller (stage), and in fact claims this; neither Brown nor Blanchard could operate correctly if only one impeller was driven. It is therefore difficult to see why one skilled in the art would combine the teachings of Brown and

Blanchard with Austin. Austin does not teach nor fairly suggest the counter rotation of the two impellers, both Brown and Blanchard require this.

It is urged that Austin, taken either alone or in combination with any of the others cited does not disclose the invention as claimed or at all.

The following prior art was made of record by the Examiner and not relied upon but considered pertinent to applicant's disclosure, as disclosing water propulsion units that utilize first and second coaxial impellers: Davies et al. (US 5,634,831, Nanami (US 5,618,213), Klepacz et al. (US 3,993,015) and Griffith (US 3,153,907).

Davies et al (US 5,634,831) does not disclose a water jet propulsion device where one impeller is configured to impart less energy to the water than the other. This was raised in the opposition to the grant of the parallel New Zealand Patent 526666, the Hearing Officer determined that this feature was not disclosed nor suggested in US 5634831.

Davies et al does not disclose or fairly suggest that one of the impellers imparts less energy to the water than the other.

Applicants contend that Davies considered either alone or in combination with any of the others cited does not disclose the invention as claimed or at all.

Klepacz et al (US 3,993,015) describes a high pressure low mass water jet propulsion device. It describes a discharge section 29, which includes an acceleration chamber 29a which has a "smoothly diminishing cross section aftwardly" – see col. 7 lines 38-39. This acceleration chamber acts to increase the pressure of the water and certainly could not be said to offer minimal impedence to the water flowing therethrough. In addition, and though the document describes a multi stage water jet propulsion unit there is no suggestion that the impellers could rotate in opposite directions. In fact there is a requirement for straightening vanes downstream of the impellers, see col. 2 lines 37-39. In col. 5, line 65, through col. 6, line 57, of the specific description the straightening vanes/straightener are discussed. The device described is

also a high pressure low mass device; this is supported by the text in col. 7, lines 29-32, where the water for cooling the prime mover is drawn off at a point of maximum pressure, this point is downstream of the rearward impeller. Klepacz et al is a high pressure low mass water jet propulsion device that is multi stage with each impeller rotating in the same direction.

There is no mention, nor suggestion, that the impellers can rotate in opposite directions, that one impeller imparts less energy to the water than the other nor that the outlet is in direct communication with the rearward impeller and offers minimal impedance to the water flowing therethrough.

Accordingly, this document either alone or in combination with any of the others cited is urged not to disclose the invention as claimed or at all.

Nanami (US 5,618,213) is directed to moving the gearing required to drive two impellers in opposite directions outside of the water flow through the pump to improve efficiency. Nanami describes a device which uses a bevel pinion 49 and two bevel gears 44, 56; this forces the two impellers 67 and 71 to rotate at the same speed but in opposite directions. There is no mention of the impellers rotating at different speeds nor imparting differing amounts of energy to the water, which is a key feature of the present invention. In addition Nanami describes a discharge nozzle 74, which is only shown as a convergent nozzle, this is described in col. 5, lines 12-14, as the final portion of the jet propulsion unit outer housing. This final portion is downstream of the rearward impeller and certainly could not be described as a minimal impedance outlet directly communicating with the rearward impeller. Nanami therefore describes a high pressure low mass jet propulsion device and as such teaches away from the present invention. There is no indication nor suggestion that one impeller imparts less energy to the water than the other, in fact by locking the speed of the impellers together it indicates the opposite.

The drawings teach away from a low pressure high mass jet propulsion device by showing a convergent discharge nozzle 74, which is necessary to generate the pressure for a high pressure low mass device. There is nothing to suggest an alternative

interpretation in the text, and low pressure high mass units had not been commercially exploited at the time of filing Namani.

This document either alone or in combination with any of the others cited does not disclose the invention as claimed or at all.

Griffith (3,153,907) is directed to a power plant for driving fluid impeller means, and though the term fluid is used the disclosure appears limited to gases. Given the fluid properties of gases and liquids are very different, gases are typically $1/1000^{th}$ the density, it is unlikely one skilled in the art of water jet propulsion devices would look to this document for design ideas. Propellers operating in free air, or impellers inside a gas turbine engine, are not comparable to impellers inside a water jet unit designed for liquid (water) pumping.

Griffith does not disclose nor suggest an outlet with minimal impedance to water flow therethrough, since this is not relevant for a turboprop or gas turbine. There is additionally no mention of one impeller imparting more energy to the water than the other, in fact there is no mention of water or other liquids. It is difficult to see how this document could be said to extend to liquids as it mentions only air. To put this in perspective some of the claims mention air inlets in the central hub to provide combustion air, not we believe likely in the hub of a water jet propulsion unit.

This document either alone or in combination with any of the others cited does not disclose the invention as claimed or at all.

ALLOWABLE SUBJECT MATTER

The Examiner states as follows: "Claims 18 and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims."

It is respectfully submitted that base Claim 1, as amended, is allowable over the cited art. Accordingly, it is requested that the requirement that claims 18 and 20 be rewritten in independent form be withdrawn.

Favorable reconsideration and passage to allowance are respectfully solicited.

It is believed that no fees or deficiencies in fees are owed. However, authorization is hereby given to charge our Deposit Account No. 13-0235 in the event any fees are owed.

Respectfully submitted,

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